

REDISCOVERY OF *BEMBIDION RUFOTINCTUM*
CHAUDOIR, WITH EXTREME RANGE AND
DISTRIBUTIONAL RECORDS OF *BEMBIDION*
AND OTHER CARABIDAE (COLEOPTERA)¹

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ABSTRACT: The history, rediscovery in Vermont, and ecology of *Bembidion rufotinctum* Chaud. are briefly described; ranges of *B. obscurellum* Motsch. and *B. rapidum* Lec. are shown to have reached the Atlantic coast (in N.H. and Mass., respectively), and that of *B. oberthueri* Hayw. to include California. The European *B. obtusum* Serv. occurs in upper New York State. Distributional records and comments on an additional 10 species of *Bembidion*, chiefly from New Hampshire, are provided, as well as notes on the adventitious *Trechus discus* Fabr., on *Platypatrobis lacustris* Darl., and *Helluomorphoides praeustus bicolor* (Harris). *Bembidion* is represented in New Hampshire by not less than 56 species, and probably not more than 70.

DESCRIPTORS: Carabidae: history, habitat, biological notes, extreme ranges, distribution.

Darlington (1931) has made a very large contribution to our knowledge of New England Carabidae in his unpublished manuscript "The cicindelid and carabid beetles of New Hampshire, with special reference to their geographical relationships", available in the Archives of Harvard University. For a number of years during my residence in New Hampshire this manuscript served as a stimulus and guide to my field studies which, at that time, were viewed by me as preparatory to an examination of the cytology of *Bembidion* species and their natural history, with the hope of unravelling some biological puzzles that could be related to the well known glacial history of the region. Regrettably that pleasant occupation necessarily ended when I relocated in California. The present account adds to Darlington's records of *Bembidion*, as well as to those for a few other notable carabids, describes the interesting history and rediscovery of *B. rufotinctum* Chaud., and establishes the fact that *B. obscurellum* Motsch., which Lindroth (1971) has shown to be increasing its range, has now reached and colonized at least one point on the Atlantic coast.

¹ Accepted for publication: January 19, 1976

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1. *Bembidion (Pseudoperypus) rufotinctum* Chaud.

Bembidion puritanum Hayw. and *B. rufotinctum* are among the least known of our New England *Bembidion*, though each is easily recognized. They have an interesting history which stands apart from that of other northeastern species in three notable ways: each has been known only from small series of specimens from Massachusetts, the precise localities of capture and habitats are unknown for the specimens on which their descriptions are based, and each has eluded rediscovery for 80 years or more. Quite possibly *B. puritanum*, known from only 4-5 specimens, when found again will prove to be a coastal form living intertidally within airbells between narrow rifts of fractured rocks submerged at high tide, as does the superficially similar *B. laticeps* Lec. along rocky areas of the southern coast of California from San Diego to at least Carmel.

So far as I can ascertain, *B. rufotinctum* is known only from Chaudoir's specimen or specimens, a total of a dozen or so specimens in the Blanchard, Fall, Hayward and Leconte collections at Harvard University, a single specimen in the Casey collection at the U.S. National Museum, and another (as *B. blanchardi* Hayw.) in the residue of the Horn collection remaining at the Academy of Natural Sciences, Philadelphia. All but Chaudoir's material was collected by Frederick Blanchard in April, May and September, chiefly or entirely in 1888, at Lowell, Middlesex County, Massachusetts. Blanchard's correspondence, in the Archives of the Museum of Comparative Zoology at Harvard, does not mention *B. rufotinctum* (= *B. blanchardi* Hayw.), so it sheds no light on its specific habitat or on the manner of its collection. As Chaudoir (1868) described *B. rufotinctum* without mention of locality, Lindroth (1963) therefore has designated Lowell, Mass. as the type locality. However, for reasons that will become clear, Lowell is very likely a place at which *B. rufotinctum* can at best only occasionally or rarely be found, for it is an unsuitable environment for the species.

It has not been possible for me to narrow down the locality of Chaudoir's material. It was received from John A. Guex (deceased 1857), possibly along with specimens of *B. planum* Hald., to judge from Chaudoir's comments, and very likely before 1854 or 1855 for in those years Guex donated his collection of Coleoptera to the Academy of Natural Sciences (Phillips and Phillips 1963). Through the kind searches of Dr. Michael G. Emsley and Mrs. Venia Phillips, both of the Academy, it can be stated that no specimens of *B. rufotinctum* are now to be found in the Guex collection under either Chaudoir's specific name or that of *B. planum*, nor does the Academy's file of Guex's correspondence contain any interchanges with Baron Chaudoir that might throw light upon Guex's source. The specimens of *B. planum* now in the Academy collections are labelled "Mass.", "N.J.", "N.Y.", and "Penn.",

the majority of which were from the collections of Charles Wilt; among these there is included a specimen of the related *B. fugax* Lec. from "Mass.", also from Wilt's material. Possibly then, Chaudoir's material came from Massachusetts. But New York may have been his source, for Csiki (1928), on grounds I have not uncovered, lists *B. rufotinctum* as from New York as well as Massachusetts. Csiki may possibly have seen or known of specimens now in Europe originating from material received from Wilt, for Horn (1886) states that Wilt engaged in "constant exchanges". New Jersey and Pennsylvania seem more remote possibilities.

In June of 1964 I found *B. rufotinctum* in abundance in the wooded Queechee Gorge of the Ottauquechee River, Windsor County, Vermont, a little less than a mile south of the crossing of U.S. Highway 4, elevation about 128 m. Here the small, rapidly running river flares out at a roughly level open area of slightly to strongly uptilted, cracked and waterworn rocks (see Doll 1961). In nearly every spring, and following heavy rains during the summer and fall, that rocky table is wholly inundated. Following subsidence of the waters, the dissected rocks retain pools of stagnant water, but along their western margin the river forms a turbulent race through a deep, narrow main channel, 5 to 10 m wide. Along the spray zone on the rocks, amid algal mats, on the otherwise bare rock itself, in shingled cracks of the rocks, and back to little more than a couple of meters of the rushing water, *B. rufotinctum* abounds. It runs rapidly on the sprayed rock faces, rarely flying. In spring and summer months, during brief periods of inundation, it is found at the new margins of the water, far back from the channel, in damp shingle and gravel. Several teneral specimens were found in mid September amid rhizoids of the low, tightly grown moss that is shallowly embedded in rock fissures along the margins of the race of the main channel. *B. rufotinctum* therefore overwinters in the imaginal state. I now have remaining some 70 specimens collected in V, VI, VII, VIII and IX, 1964-1967: 34 males and 36 females. In all of my collecting, males and females have occurred in nearly equal numbers.

The fact that *B. rufotinctum* is a dweller, and presumably a forager, on nearly bare rock ledges along turbulent waters no doubt accounts for its apparent rarity, as that particular and seemingly barren and harsh environment is rarely occupied by other *Bembidion*, and is hardly likely to be closely attended by collectors. Prof. Darlington, who visited the Queechee Gorge locality with me, says that the river at Lowell, Mass., with its mud and sand, is not at all like that at the rocky gorge, and that he suspects that the specimens collected by Blanchard in early spring may have been taken in flood debris, for he believes Blanchard collected in floods. If so, the specimens taken later in the year at Lowell may also have arrived flood-borne.

Elsewhere in the immediate area adjacent to that inhabited by *B. rufotinctum* are to be found *B. honestum* Say and *B. planum* Hald. (along a

gravel bar), *B. nigrum* Say, *B. semistriatum* Hald., *B. versicolor* Lec., and *B. oberthüeri* (where there are stretches of fine or sandy muds far back from the race), *B. castor* Lindr., *B. patrule* Dej., *B. rapidum* Lec. and, on a sandy rise that remains above water during inundation, thicketed with small willows, *B. postremum* Say.

Mr. Robert Davidson, of the Department of Zoology, University of Vermont, and Mr. Paul Choate, of the Department of Entomology, University of New Hampshire, have since collected *B. rufotinctum* not only at Queechee Gorge, but abundantly elsewhere. Publication of their notes and observations will greatly extend our knowledge of this very pretty and hitherto obscure *Bembidion*.

2. *Bembidion (Phyla) obtusum* Serv.

Lindroth (1963) first called attention to the occurrence of this "truly European species, quite recently discovered in North America and perhaps not established", citing 3 examples from Ontario (Bondhead, 7.IX.56) Canada, as well as one taken on shipboard in New York City. In Berlese samples of leaf litter from Bergen Swamp, Genesee Co., N.Y., 29.VIII.64, Prof. W.B. Muchmore recovered a mature female and 3 mature males of this species, the identity of which I have checked against European specimens, including preparations of the aedeagus. Like the 3 Canadian specimens, all 4 have atrophied wings. The species is therefore very likely firmly established. As this locality is only some 15 miles southwest of Rochester, N.Y., *B. obtusum* quite possibly was introduced in upper New York State prior to the First World War (see Cooper 1961). Netolitzky (1931) summarizes its distribution in Europe.

3. *Bembidion (Peryphus) obscurellum* Motsch.

Lindroth (1971) has pointed to this species as a clear example of one that has expanded its range eastward in recent times, an expansion presumably made possible and encouraged by the extensive deforestation of recent years. According to Lindroth it was unknown from east of Manitoba until discovered in western Ontario in 1947. Lindroth points out that since then it has been reported from near Lake Superior (1956), from Quebec (Ville de Louraine, 1964) and Vermont (1965). On 10.VI and 26.VI.66, in a large tract of sandy fields at Rye, Rockingham Co., New Hampshire, dominated by clumps of *Spartina pectinata* Link, *S. patens* (A.T.) Muhl. and mats of *Spergularia marina* (L.) Ginseb., *B. obscurellum* was abundant amid the roots of the grass clumps and under litter, along with the earwig *Forficula auricularia* L. Evidently the *Bembidion* were members of a well-established population, for some 14 (6 males, 8 females) of the 53 specimens taken were

teneral. The sex ratio in my sample is 1.8 : 1, 34 males and 19 females. As *B. obscurellum* is common in California, it now ranges from coast to coast in North America, and is a circumpolar species.

4. *Bembidion (Eupetiedromus) immaturum* Lindr.

Described from Newfoundland by Lindroth (1955) and recorded by him from Quebec and New Hampshire, I can add that it has also been found at Whittier, Carroll Co., V and VI.65, Concord, Merrimack Co., 22.V.65, and running on soft, very fetid mud in a small *Typha* marsh at Lancaster, Coos Co., 15.V.63. A single specimen received from Mr. Loren Russell was taken by him at Davenport, Scott Co., Iowa in IX.66, considerably extending the known range to the west and south.

5. *Bembidion (Notaphus) rapidum* Lec.

B. rapidum was not known to reach the Atlantic coast, nor had it been recorded from northeastern states (Lindroth 1963). It has been found by me sparingly at Hanover, Grafton Co., 26.VII.63 and Lake Chocorua, Carroll Co., 26.VI.65, and in a light trap by Prof. R.L. Blickle, University of New Hampshire at Rochester, Strafford Co., 2.VII.65, all New Hampshire localities. It reaches the Atlantic coast at Woods Hole, Plymouth Co., Mass., where Mr. Geoffrey Pollitt (of Harvard University) took a small series of specimens on 31.VII.66. It is also frequent in June and July at Mendon Ponds, Monroe Co., N.Y. (Dr. Jakov Krivshenko), Galeton, Potter Co., Pa., and in black light collections made by Prof. S. Hughes-Schrader at Durham, Durham Co., N.C.

6. *Bembidion (Notaphus) oberthueri* Hayward

Ranging from the Rockies to the east, and not uncommon in my experience in Pennsylvania, Vermont and New Hampshire, Darlington (1931) regards it as "probably a recent immigrant from the west". It is known from as far west as Alberta; the sole record from British Columbia (Kamloops) is regarded by Lindroth (1963) as doubtful. On 14.VI.70 I collected a single male from a sunned, muddy, grassy, openly wooded streamside near Poopout Hill (ca. 2290 m elevation), south of Barton Flats, San Bernardino Co., Calif.

7. Other records of *Bembidion*

To Darlington's extensive list (some 35+ species) of New Hampshire *Bembidion* may be added the following:

B. (Ochthedromus) americanum Lec. from Grafton Co., Hanover, 19.VII.65, Carroll Co., Lake Chocorua, 26.VI.65, and from black light collections by Prof. Blickle at Merrimack Co., Hooksett, 8.VII.63, and at Strafford Co., Rochester, 2.VII.63, Durham, 13.VII.63 and 8.VIII.65, and Lee., 17.VII.65.

B. (Notaphus) cordatum Lec., a single female, on alga-overgrown mud at the inlet of Girl Brook to the Connecticut River during a prolonged spell of low water, Hanover, Grafton Co., 19.VII.65.

B. (Notaphus) constrictum Lec., salt marsh at Hampton, Rockingham Co., 25.VIII.64, 15.VIII.65 (evidently close to or at the same locality at which Darlington collected *B. (Notaphus) contractum* Say. The aedeagus and fully developed wings leave little doubt as to the identity of my specimens.

B. (Semicampa) praticola Lindr., Hanover, Grafton Co., 2 specimens, 18.VII.64.

B. (Trepanedoris) fortistriatum Motsch., wooded, swampy margins of sphagnum bogs at Grantham and North Grantham, Sullivan Co., 19.VI.66 and 7.VIII.66.

The following are difficult but not uncommon forms now at last recognizable with confidence from Lindroth's great work (1963); very probably all were taken by Darlington:

B. (Notaphus) castor Lindr., counties: Carroll, Cheshire, Coos, Grafton Merrimack and Sullivan, V-VIII.

B. (Furcacampa) mimus Hayw., counties: Cheshire, Grafton and Sullivan, V-VIII.

B. (Trepanedoris) concretum Csy., counties: Grafton, Sullivan and Strafford, VI-X.

8. *Trechus (Lasiotrechus) discus* Fabr.

The first record for North America of this Eurasian species is that of Chagnon (1934), at light, Lanoraic, Quebec, 29.VI.33. Lindroth (1963) has given additional records for Canada, as well as 2 from upper New York State (Lyons 1950, *ca.* 27 miles west of Rochester, and Ithaca, 1955). I have taken individual specimens under rocks along the White River at White River Junction, and along the Connecticut River at Hartland, Windsor Co., Vermont. It is frequent at black lights in Hanover, Grafton Co., and has been

taken at black light by Blickle at Durham and Lee, Strafford County, New Hampshire; all records are for July and August; collectively they show the species to be established in New England. As for *B. obtusum*, an original introduction may have occurred at Rochester, N.Y. According to Lindroth (1945, 1963), it is most frequent in Europe during August, overwinters as a larva, and is frequently found in burrows of small rodents and moles.

9. *Platypatrobus lacustris* Darlington

Described from a unique specimen by Darlington (1938), this remarkable carabid remained a great rarity, only 9 or so specimens being known to 1965, including one from Maine (Robert, 1963). On Darlington's suggestion that the mite commonly carried by *Platypatrobus* might offer a clue to its habitat, Goulet (1965) submitted the mite to Dr. E. Lindquist, who identified it as a form occurring commonly in beaver lodges. Thereafter Goulet took some 51 *P. lacustris* near Ottawa in association with an abandoned beaver lodge standing on very wet soil. Thus an insightful hint, and an admirable bit of detection led to a most notable discovery. Since then, Choate and Dyrkacz (1975) reported capture of a large series of *Platypatrobus* from the walls, mud foundation and chamber of a beaver lodge at Ossipee Co., N.H. Bell and Bell (1964) reported 2 teneral specimens taken at black light near Stowe, Lamville Co., Vt., 28.VIII.63. Prof. Blickle took a teneral female (21.VI.65) and a mature male, with mites (28.VI.65), at black light, Jefferson, Coos Co., N.H.

10. *Helluomorphoides praeustus bicolor* (Harris)

A single female, taken at black light by Blickle, Durham, Strafford County, 11.VI.65; a noteworthy record and no doubt not an accidental occurrence for Darlington records it from Swanzey Pond, Cheshire Co., 19.V.

Considering now Darlington's records of *Bembidion* from New Hampshire, plus the new records and determinations given here, and Lindroth's (1963) record of *B. (Trepanedoris) pseudocautum* Lindr. from New Hampshire, 47 species are now definitely known from New Hampshire. In addition, there are 9 species, not mentioned here, which I have taken close by in Vermont in the company of Prof. Ross T. Bell, of the University of Vermont, which without doubt are to be found in New Hampshire as well. So the *Bembidion* fauna of New Hampshire is not less than 56 species nor, to judge from Lindroth's (1963) extensive records of North American *Bembidion*, is it likely to exceed 70. New Hampshire, therefore has a representation of about 22 to 28% of the total likely number of species to be found in North America north of Mexico (cf. Lindroth, 1967).

ACKNOWLEDGEMENT

It is a pleasure to express my gratitude to all those whose names are mentioned in the text for their help and for specimens with which they provided me, to Prof. James P. Poole of Dartmouth College who identified the plants dominating the habitat of *B. obscurellum*, to Prof. P.J. Darlington and Dr. John F. Lawrence of Harvard, to Mr. Robert Davidson of the University of Vermont, and to Dr. Gerald Noonan of the Milwaukee Public Museum, all of whom cordially provided information otherwise inaccessible to me.

LITERATURE CITED

- Bell, R.T. and J.R. Bell. 1964. *Platypatrobis lacustris* Darlington in Vermont. Proc. Ent. Soc. Wash. 66: 100.
- Chagnon, G. 1934. A carabid beetle (*Lasiotrechus discus* F.) new to North America. Canad. Ent. 66: 168.
- Chaudoir, M.de. 1868. Observations synonymiques sur les carabiques de l'Amérique septentrionale et descriptions d'espèces nouvelles de ce pays. Rev. & Mag. Zool. (2e Ser.) 20: 239-245.
- Choate, P.M. and T.J. Dyrkacz. 1975. A new state record for *Platypatrobis lacustris* Darlington (Coleoptera : Carabidae). Coleopt. Bull. 29: 82.
- Cooper, K.W. 1961. Occurrence of the European pselaphid beetle *Trichonyx sulcicollis* (Reichenbach) in New York State. Ent. News 72: 90-92.
- Csiki, E. 1928. Carabidae: Mormolycinae, Harpalinae I. Coleopterum Catalogus (Junk), Pars 97, 226 pp.
- Darlington, P.J. 1931. The cicindelid and carabid beetles of New Hampshire, with special reference to their geographical relationships. MS, 164 pp. Archives of Harvard University. (Abstract in: 1932 Summaries of [Harvard] Theses, 1931: 21-22, Harvard Univ. Press.).
- Doll, C.G., (ed.). 1961. Centennial geologic map of Vermont. Vermont Devel. Dept., Vermont Geol. Surv. State of Vermont.
- Goulet, H. 1965. The habitat of *Platypatrobis* Darlington (Coleoptera : Carabidae). Psyche 72: 305-306.
- Horn, G.H. 1886. Mr. Charles Wilt. Trans. Amer. Ent. Soc. 13 (Proc.): VI.
- Lindroth, C.H. 1949. Die Fennoskandischen Carabidae. Eine Tiergeographische Studie. III. Allgemeine Teil. 911 pp. Stockholm.
- Lindroth, C.H. 1955. The carabid beetles of Newfoundland including the French islands of St. Pierre and Miquelon. Opusc. Ent. Suppl. 12: 1-160.
- Lindroth, C.H. 1963. The ground-beetles (Carabidae, excl. Cicindelinae) of Canada and Alaska. Part 3. Opusc. Ent. Suppl. 24: 201-408.
- Lindroth, C.H. 1967. On the number of *Bembidion* species (Coleoptera, Carabidae) occurring in North America. Coleopt. Bull. 21: 28-31.
- Lindroth, C.H. 1971. On the occurrence of a continental element in the ground-beetle fauna of Eastern Canada (Coleoptera : Carabidae). Canad. Ent. 103: 1455-1462.
- Netolitzky, F. 1931. Die Verbreitung des *Bembidion obtusum* Serv. Ent. Blatt. 27 (1), 4 pp. insert with map (no pagination).
- Phillips, V.T. and M.E. Phillips. 1963. Guide to the manuscript collections in the Academy of Natural Sciences of Philadelphia. Acad. Nat. Sci. Phila., Special Publ. No. 5.
- Robert, A. 1963. Une première station du *Platypatrobis lacustus* Darlington dans le Québec (Coleoptes : Carabidae). Ann. Soc. Ent. Québec. 1963: 59-60.